

# To Give or to Forgive?

## Aid versus Debt Relief

*Tito Cordella*  
*Alessandro Missale*

The World Bank  
Latin American and the Caribbean Region  
Office of the Chief Economist  
October 2011



## Abstract

Is generalized debt relief an effective development strategy, or should assistance be tailored to countries' characteristics? To answer this question, the authors build a simple model in which recipient governments reveal their creditworthiness if donors offer them to choose between aid and debt relief. Since offering such a menu is costly, it is preferred by donors only when

the cost of assistance is low, and the probability that an indebted country is creditworthy is high enough. For lower probabilities and higher costs of assistance, donors prefer a policy of only debt relief. Very limited aid is the preferred policy only for high costs of assistance, and low probabilities that the government is creditworthy.

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# To give or to forgive? Aid versus debt relief<sup>\*</sup>

Tito Cordella and Alessandro Missale<sup>†</sup>

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<sup>\*</sup>We thank Doerte Doemeland, Andrea Presbitero, Maurice Shiff and Jivago Ximenes for helpful comments and suggestions.

<sup>†</sup>Tito Cordella, World Bank, 1818 H St. NW, Washington, DC 20433, USA, E-Mail: [tcordella@worldbank.org](mailto:tcordella@worldbank.org).  
Alessandro Missale, DEAS, Università degli Studi di Milano, Via Conservatorio 7, 20122 Milano, Italy; E-mail: [alessandro.missale@unimi.it](mailto:alessandro.missale@unimi.it).

# 1 Introduction

A main criticism of debt relief initiatives is that developing countries' poor investment performance may reflect governments' preferences rather than debt overhang problems (Easterly, 2002). Were this the case, the impact of debt relief initiatives on long-term growth would be limited. Indeed, if high levels of indebtedness mainly reflect countries' discount factors, then debt forgiveness will just create the conditions for the accumulation of new unsustainable debt, and history will repeat. While we cannot rule out this possibility, it is difficult to believe that no highly indebted government cares about long term growth, and would not invest in worthy projects were its debt cancelled.

In our view, the real problem with debt relief is that, while it helps making a country creditworthy, by itself it is not enough. A creditworthy borrower is one which has little debt and is believed to be willing to repay it (good reputation). Unfortunately, generalized debt relief, as it has been conceived, reduces the stock of debt but may not help countries building their own credit history. However, this does not mean that it would not be possible to design alternative debt relief policies so that (private) lenders could distinguish the potentially good borrowers from the "serial defaulters." Were this possible, what would be the costs of such policies when compared to policies of generalized debt relief?

In order to answer this important question, in this paper we develop a simple model in which donors do not know debtor governments' discount factors (and thus their willingness to invest) but are allowed to use a menu of official assistance instruments (aid or debt relief) as a screening device. The idea we explore is that low-discount governments value debt relief more than high-discount ones. This means that if they are asked to choose between aid or debt relief, they will choose debt relief (while high-discount ones will prefer aid if the latter is large enough) and the choice will convey precious information about their time preferences, and thus create the conditions for greater market access. On the contrary, a policy that provides debt relief to all countries leads to an inefficient allocation of credit. The reason is that if private lenders cannot distinguish good borrowers from serial defaulters, the amount of loans that the former obtain is lower, and the interest rate higher than if their characteristics were disclosed.

The main message of this paper is that the design of official assistance is important and that the optimal assistance policy depends both upon recipients characteristics and donors' generosity. In particular, we show that the more generous donors and the more patient recipient governments are, the higher are the returns of aid-or-debt relief policies that allow creditworthy governments to signal their type.

The paper is organized as follows. Section 2 briefly reviews the literature on debt relief. Section 3 presents stylized facts on capital market access by countries that received MDRI relief. Our asymmetric information model of development assistance and private lending is introduced in Section 4 and is used in Section 5 to examine the effects of three alternative development policies: generalized full debt relief; the offer between aid or debt relief; and a policy of only aid. Section 6 studies the welfare properties of these three policies. Section 7 discusses partial versus full debt relief. Section 8 concludes.

## 2 Related Literature

The existing literature highlights two main channels through which debt relief may affect investment and growth. The first is the resource channel: debt relief reduces debt service payments and this

automatically increases investment opportunities in resource constrained countries (Cohen 1993). The second is the debt overhang channel: debt relief increases the benefits that debtors countries may reap in investing and/or undertaking reform, and thus increase the incentives to pursue such policies (Krugman 1988, Sachs 1989).

Regarding the first channel, the empirical findings are mixed. On the one hand, Bird and Milne (2003) question the resource constrained assumption arguing that Highly Indebted Poor Countries (HIPCs) serviced their debt out of the loans and grants provided by official donors. On the other hand, although debt service payments are usually not significant in debt-growth equations (Patillo et al. 2004), there is some evidence suggesting that debt service payments crowd out investment (Chowdhury, 2004; and Hansen, 2004). Interestingly, Presbitero (2006) finds that the impact of debt service on investment is stronger than the effect of foreign aid.

Regarding the second channel, the support is much stronger even if results depend very much on the empirical specification, and further work is needed to fully understand the transmission mechanism (Rajan 2005). Existing evidence suggests that debt reduces growth when the debt-to-GDP ratio lies between a “debt overhang” (Pattillo et al., 2002, 2004) and “debt irrelevance” threshold (Cordella et al., 2010). However, these thresholds and even the negative debt-growth relation could hinge on country-specific factors, such as the quality of policies and institutions (Imbs and Ranciere 2005); and countries with better policies exhibit higher debt overhang and debt irrelevance thresholds than countries that perform less well and for which the negative debt-growth relation is weaker (Cordella et al., 2010).

Very few studies investigate the direct effects of debt relief.<sup>1</sup> Among these Depetris-Chauvin and Kraay (2005), Presbitero (2009), and Johansson (2010) find no significant effect of debt forgiveness on investment and growth in HIPCs; Cassimon and Van Campenhout (2007) show instead that debt relief is more effective than aid in promoting public investment in the long run, at least in the sample of HIPCs that have reached the “decision point.”

A potential advantage of debt relief *vis-à-vis* other forms of assistance is to create access to private capital markets. According to Diwan and Rodrik (1992), new lenders may be deterred from investing in highly indebted countries if they expect to be “taxed” by old creditors. If this is the case, profitable investment opportunities may be forgone for lack of capital inflows, and a debt reduction by old private creditors may be needed to convince new and more efficient lenders to step in. Indeed, Arslanalp and Henry (2005) show that Brady deals succeeded in stimulating investment and growth principally because of the new flow of foreign lending to the private sector. Looking at the private sector response, Raddatz (2011) estimates how the stock prices of South African multinational firms reacted to the announcement of debt relief in countries in which they had subsidiaries, and finds a positive effect which is consistent with the debt overhang story.

HIPC’s ability to access private credit may depend, however, on the quality of their policies and institutions. Arslanalp and Henry (2006) contend that the impact of debt relief on HIPCs is limited because such countries generally lack those basic economic infrastructures and institutions that are needed to attract private foreign capital. Asiedu (2003) presents a model where only countries with a sufficiently high discount factor, that one can interpret as high levels of institutional quality, can commit to repay and thus attract foreign investment. By increasing the country’s repayment capacity, debt relief lowers the threshold level of the discount factor needed to access world capital markets but probably not enough for HIPCs to obtain external financing.

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<sup>1</sup>This may reflect the difficulty in properly measuring debt forgiveness.

Some critics of the Multilateral Debt Relief Initiative (MDRI) claim, instead, that the problem is not too little but too much lending, and that debt forgiveness will allow HIPC's to start (again) borrowing excessively using fiscal space to finance consumption. According to Easterly (2002), to the extent that high debts and repayment difficulties are a sign of high discount rates, debt relief is likely to be granted to exactly those countries that are less willing to invest. Bauer (1991) suggests that debt relief creates moral hazard in that it encourages countries to take on new loans because of the expectation of further relief. Easy access to external financing is also viewed as undermining debt sustainability. Radelet (2005) warns that debt relief could restart a vicious lend-and-forgive cycle. Official donors have also expressed concerns about the risk of “overborrowing” at non-concessional terms in the aftermath of debt relief and warned against the possibility that ‘free riding’ on debt relief and aid by non-concessional lenders might undo years of international efforts to restore debt sustainability (World Bank 2006, IDA and IMF 2006).

Worries about imprudent borrowing/lending may appear contradictory in light of what Bulow (2000) considers the main test for successful debt relief: whether it restores positive net resource transfers to countries where international lending is profitable. Absent this motivation, one may even wonder why debt relief was preferred to conventional aid.<sup>2</sup> Michaelowa (2003) and Bird and Milne (2003) suggest that debt relief is the cheapest way to obtain public credit and may be granted to conceal imprudent past lending. However, Reisen and Sokhna (2008) find little evidence of “imprudent lending” to debt-relief beneficiaries up to 2006.

Finally, this paper is related to the recent theoretical contributions on aid effectiveness when donors and recipients’ objectives differ.<sup>3</sup> By focusing on incentives, this literature underscores that the way aid is disbursed does matter, and donors should tailor their assistance according to the recipient country’s characteristics. In this respect, the aid versus debt relief analysis of this paper complements Cordella and Dell’Ariccia (2007), who focus on the trade-off between budget support and project aid in fostering development and growth, and Cordella and Ulku (2007) who instead look at the grant versus loans trade-off.

### 3 Debt Relief and Capital Market Access

Notwithstanding the pessimistic predictions and concerns of many debt relief critics, low-income countries are now experiencing a renewed access to international capital markets: private capital inflows to Sub-Saharan African countries rose sharply, from very low levels in 2002 up to 84 billion dollars in 2007, with loans accounting for a third of the total (Delechat et al. 2010). While such figures mainly reflect FDI and equity inflows in the mineral, banking, and telecommunication sectors—and cover non-HIPC as well as HIPC countries—some HIPC's have already re-started borrowing from commercial banks at non-concessional terms and issued bonds on international capital markets.

On the bright side, Ghana became the first African HIPC to issue a 10-year \$750 million Eurobond, in September 2007. Senegal also successfully launched a 5-year \$200 million Eurobond in December 2009, and Congo restructured London Club commercial debt in November 2007 with the launch of a 30-year \$478 million nonrated global bond (Domeland and Kharas 2009). In the

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<sup>2</sup>One additional motivation, which is beyond the scope of this paper, is that debt relief, by clearing arrears, allows to normalize the relation between donors and countries in default.

<sup>3</sup>See, among others, Murshed and Sen (1995), Svensson (2000), Cordella and Dell’Ariccia (2002), and Azam and Laffont (2003).

meantime, Tanzania (which took a \$400 million loan from China in August 2009) and Zambia are seeking a credit rate in order to issue \$500 million Eurobonds later this year, after they had to postpone their plans in 2008 (together with Angola, Kenya and Uganda) because of the global financial crisis. At the same time, several HIPC, which developed local-currency bond markets, have succeeded in selling treasury bills in their own currency to foreign investors. In 2008 the share of domestic debt held by foreign investors was 13% in Zambia, about 11% in Ghana, estimated at more than \$400 million, and likewise significant in Tanzania and Uganda (Delechat et al. 2010, Domeland and Kharas 2009).

On the less bright side, Côte d'Ivoire, a HIPC that has not yet reached completion point, after exchanging defaulted Brady bonds with a 22-year Eurobond worth \$2300 million in April 2010, defaulted on the same bond in February 2011. Further insights into the ability of post-MDRI countries to access international financial markets can be gained from data on public and private borrowing from private creditors taken from the Global Development Finance (GDF) database of the World Bank.

Figure 1a reports the unweighted average of the ratios of yearly disbursements on long-term loans and bonds to GDP for two groups of IDA-only countries: the 21 HIPCs that received MDR in 2006 (post-MDRI countries);<sup>4</sup> and a control group of 15 countries that includes the remaining non-HIPC IDA-only countries but excludes resource rich Angola and Nigeria. The yearly amount of long-term borrowing by post-MDRI countries increased sharply from less than 0.3% of GDP in 2006 to more than 1% in 2007 to stabilize thereafter around 0.9% of GDP in the wake of the global financial crisis.

This performance is partly due to the low level of private inflows in the period up to 2006 when HIPC countries, being under IMF-supported programs, had to abide by stringent limits on non-concessional borrowing. However, Figure 1a shows that the increase in long-term borrowing from private lenders in relief-recipient countries was not much faster than in other non-HIPC IDA countries. Despite the latter group has an unweighted average debt-to-GDP ratio of 51%, higher than the 32% ratio of post-MDRI countries, in 2007 it also experienced a sustained increase in new borrowing; from 1.2 to 1.9% of GDP.

–Insert Figure 1a–

Further evidence on private foreign lending to low-income countries can be obtained from data on the amount of international claims of the commercial banks of the 30 industrial countries reporting to the Bank of International Settlement (BIS). Although BIS data exclude loans from emerging lenders, they cover short-term loans that are not reported in the GDF statistics of the World Bank. Figure 1b shows banks' total financial claims in foreign currencies, on the same groups of countries considered above, on a consolidated basis,<sup>5</sup> and tells a similar story: while, after the full implementation of MDRI relief in 2006, foreign claims (relative to GDP) on post-MDRI countries have increased faster than in non-HIPC IDA-only countries, since then the two groups behaved quite similarly.

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<sup>4</sup>The MDRI group also includes Bolivia which is an IDA-blend country.

<sup>5</sup>That is, net of accounts between head offices and their branches and subsidiaries.

–Insert Figure 1b–

Although debt relief has brought the debt of HIPC countries to sustainable levels and allowed these countries to gain access to external financing, the evidence suggests that such countries remain somehow credit constrained (for instance *vis-à-vis* other IDA countries that, despite their higher debt ratios, could build a track record of creditworthiness). Furthermore, the new borrowing from private creditors to HIPC has come at high interest rates. The default risk premium that post-MDRI countries have to pay on new debt can be measured by the spreads between the yields on the dollar bonds issued by Ghana and Senegal and the yield on US Treasuries of the same maturity. Figure 2a shows that the yield spread on the Ghana bond has remained above 4% while the spread on the Senegal bond has been even higher at 6.5%.

–Insert Figure 2a–

Further evidence of the relative high interest rates at which post-MDRIs borrow comes from the GDF database. Figure 2b shows the simple mean for post-MDRI countries of the average interest rates that they pay on new public and publicly guaranteed debt from private creditors and from official creditors.<sup>6</sup> While interest rates on concessional official lending has remained below 2% over the whole period, interest rates on private lending has fluctuated around 4% reaching 6% in 2007 when new borrowing became available after the implementation of MDRI relief.<sup>7</sup> More importantly, there is no evidence that debt relief initiatives have brought about a reduction in the interest rate on new private debt despite the fall in debt levels.

–Insert Figure 2b–

This brings us to the critical question of our paper: Would it have been possible to design the debt relief initiative so that markets could distinguish between good borrowers and bad ones and doing so would facilitate capital market access to the former (but not to the latter)? In order to shed some light on such an important question, and provide some thoughts on how to design future debt relief initiatives, in the remaining of the paper we sketch a simple model that could help us to better understand the incentive problems associated with debt relief versus other more traditional forms of assistance.

## 4 An Asymmetric Information Model of Debt Relief, Aid and Private Lending

In this paper, we extend Sachs (1988) classical debt overhang model introducing uncertainty about (debtor) governments' time preferences and thus their willingness to invest. More precisely, we

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<sup>6</sup>Country data on interest rates are weighted averages of the interest rates on new debt commitments taken from the GDF database.

<sup>7</sup>Evidence of higher borrowing costs would emerge from excluding bank credit covered by guarantees of export-credit agencies.



assume that a government's discount factor is  $d^j$ , where superscript  $j$  can either be "low" ( $j = l$ ) when the government is "impatient," or "high" ( $j = h$ ) when instead it is "patient," and discounts the future less. We thus have that  $d^l < d^h < 1$ . We also assume that official lenders/donors do not know the discount factor of any particular government but they do know the probability distribution of types and correctly assign a probability  $\pi \in (0, 1)$  that the government is patient.

We assume that there are two periods,  $t = 0, 1$ . In each period, the government has an endowment equal to  $w$ . At the beginning of period  $t = 0$ , the government has an outstanding debt equal to  $D$  to be serviced in period  $t = 1$ . In period  $t = 0$ , the government may also receive grants,  $A$ , from official donors and/or new credit,  $L$ , from private lenders and must decide how much to consume and how much to invest for consumption in the next period.<sup>8</sup>

The government utility function is given by:

$$U^j = \begin{cases} c_0 + d^j c_1 & \text{if } c_0 \geq w, \\ -z & \text{otherwise;} \end{cases} \quad (1)$$

where  $z > 0$  is an arbitrarily large constant that captures the idea that  $c_0 = w$  is the subsistence level of consumption. Alternatively, we could assume that the endowment  $w$  cannot be invested.

First period consumption is equal to

$$c_0 = w + A + L - I, \quad (2)$$

where  $A$  is the amount of aid (in the form of grants) from official donors,  $L$  is the amount of new loans from private lenders, and  $I$  denotes investment. Since in period  $t = 0$  consumption cannot be lower than the endowment ( $c_0 \geq w$ ), investment should necessarily be financed out of external resources,  $A$  or  $L$ .

We also assume that the absorptive capacity of a developing economy is limited in that there is an upper bound to the number of projects that can be implemented.<sup>9</sup> Denoting with  $K$  the maximum amount of productive investment, the return on investment is equal to

$$R(I) = \rho \min\{I; K\}, \quad (3)$$

where  $\rho$  is the gross return on the investment that does not exceed  $K$ . It is worth noting that investment yields the same return independently on whether it is financed through new loans or aid, that is, aid is fully fungible.

In period  $t = 1$ , the government decides whether to default or repay the (old and new) debt. If the government decides to default on its obligations, the country loses a share  $\gamma < 1$  of its current output  $X$ , a loss that it is only partially appropriated by debtholders. Indeed, we assume that creditors can appropriate a share  $0 < \phi < 1$  of the output loss of a country,  $\gamma X$ .<sup>10</sup> We refer to  $\phi$  as the recovery rate.

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<sup>8</sup>We further assume that aid cannot be invested at the international risk free rate. This is quite a realistic assumption in the case of HIPC as resources invested abroad could be confiscated to repay previous obligations. In addition, the donor community can make pressures for aid to be spent rather than saved.

<sup>9</sup>Alternatively, we could assume decreasing returns from investment.

<sup>10</sup>Notice that when  $\phi \rightarrow 0$  our formulation converges to the trade sanction story, and when  $\phi \rightarrow 1$  to the case of complete renegotiation in which the indebted country can fully renegotiate its debt to avoid sanction. The intermediate cases could encompass alternative arrangements between creditors and debtors that are beyond the scope of this paper.

Hence, if the government repays its obligations, second period consumption is equal to

$$c_1 = w + \rho \min\{I; K\} - rL - D, \quad (4)$$

where  $r$  is the gross interest rate on new loans offered at time  $t = 0$ . Finally, we assume that the lending market is competitive, that private lenders are risk neutral, and that the risk-free (gross) interest rate is equal to  $i$ , so that  $r \geq i > 1$ .

If the country defaults on debt, its second period consumption is equal to

$$c_1 = (1 - \gamma)[w + \rho \min\{I; K\}]. \quad (5)$$

In order to simplify the analysis and focus on economic interesting cases we make the following assumptions:

$$\gamma w < D, \quad (A.1)$$

$$\gamma \rho < i < \rho, \quad (A.2)$$

$$d^l \rho < 1, \quad (A.3)$$

$$d^h \min\{i; (1 - \gamma)\rho\} > 1, \quad (A.4)$$

$$D > iK. \quad (A.5)$$

Let briefly discuss what such assumptions imply. Assumption (A.1) implies that, absent any form of aid or debt relief, the developing country will default on its debt as the cost of servicing the debt,  $D$ , is higher than the cost of default,  $\gamma w$ . Assumption (A.2) implies that investment increases default costs by less than it increases debt, which imposes an upper bound to the amount of credit that a country might receive. The crucial assumptions characterizing the time preferences of the two governments, and thus their consumption-investment decisions, are (A.3) and (A.4). Assumption (A.3) states that for an impatient government the utility of a unit of current consumption is greater than the utility (in present value terms) that it would obtain by investing the same unit in production. This implies that it would consume all resources it receives in the current period. Assumption (A.4) instead implies that for a patient government the utility of consumption in period 1 discounted either at the risk-free rate or by the cost of default is higher than the utility of consumption in period 0.

These assumptions capture the idea that governments facing the same profitable investment opportunities behave quite differently depending on their time preferences. Governments with short horizons (impatient); they would rather consume the funds received by the donor community or by private lenders as in Easterly (2002). On the contrary, patient governments would invest such funds in profitable projects. These are also the governments which would mostly benefit from a “fresh start” provided by debt relief as in Sachs (2002). It would certainly be desirable to distinguish the type of government so that only patient governments may have access to international capital markets. Finally, assumption (A.5) guarantees that the absorptive capacity is limited and, thus, that (after debt relief) the new loans used to finance productive investment do not exceed the old debt and thus can be “sustainable.”

## 4.1 The consumption-investment decision

We start this section by examining the different consumption-investment choices of patient and impatient governments as well as their default decisions in a benchmark case in which no form of aid or debt relief is anticipated. In this case, it follows directly from our assumptions that:

**Lemma 1** (i) *An impatient government consumes in period  $t = 0$  all the resources (aid or loans) that it receives. A patient government, instead, invests all the resources it receives up to amount  $K$  in which the absorptive capacity of the economy is reached. (ii) In absence of aid or debt relief, both types of government default on their debt obligations and, as a consequence, are not able to borrow. (iii) The maximum amount of loans that a government may obtain is  $L = K - A$ .*

**Proof:** In Appendix

Hence, in our very simple set up, while an impatient government would never invest the funds provided by the donor community or obtained from the capital market, a patient government always invests these resources.<sup>11</sup> However, since the absorptive capacity of the economy is limited, the amount of funds that a patient government invests does not exceed  $K$ . In addition, in the absence of aid or debt relief, both types of government would default on their past debt obligations and thus they would not receive any new credit by private lenders. Starting from such a situation, in what follows we analyze how aid or debt relief policies affect the consumption-investment and default decisions of patient and impatient governments.

## 5 Development Assistance

### 5.1 A policy of generalized debt relief

In this section, we show that a policy that provides debt relief to all countries allows both types of government to access international capital markets. In addition, as the governments' time preferences are not revealed, the amount of new credit that the two types obtain is the same and, in general, the interest rate at which they can borrow is higher than the risk-free interest rate because the impatient government will default on the new loans. This implies that patient governments invest and repay the loans but obtain lower funds and at worse conditions than under full information. To simplify the analysis, in what follows, we only consider the case in which the debt is entirely cancelled and, to make the analysis of any interest, we assume that

$$K > \frac{\gamma w}{i}. \quad (\text{A.6})$$

If this were not the case, then both types of government would always repay the new loan and the patient government would always obtain the desired amount of resources  $L = K$  (at the risk-free interest rate). Ruling this trivial case out, we have the following result:

**Proposition 1** *If the probability that a government is patient is low ( $\pi \leq \bar{\pi}$ ), complete debt relief will give countries a limited level of market access at the risk-free rate; if instead the probability is sufficiently high ( $\pi > \bar{\pi}$ ), debt relief will provide greater market access but at a higher interest rate, as impatient governments will find it optimal to default.*

**Proof:** In Appendix

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<sup>11</sup>This result depends on the assumption that  $d^h(1 - \gamma)\rho > 1$ . If such an assumption does not hold, then a patient government that defaults in period  $t = 1$  consumes all the resources it receives in period  $t = 0$ . This would complicate the analysis but would not affect our qualitative results.

Referring the reader to the appendix for the exact values of  $\bar{\pi}$  and for a complete analysis, we present our main findings in an intuitive way with the auxilium of Figure 3 and Figure 4 where we plot loan volumes and interest rates as a function of the probability  $\pi$  that the government is patient (for arbitrary values of the parameters),<sup>12</sup> distinguishing between the case of relatively high and low absorptive capacity.

– Insert Figures 3 and 4 –

In the former case ( $K > \frac{\gamma w}{i(1-\gamma)}$ ), Figure 3 describes the main forces at stake. If the probability that the government is patient is low ( $\pi < \bar{\pi}_1$ ), then the only equilibrium is one in which credit is cheap (everybody is charged the risk-free rate) but rationed. The reason is that the pool of borrowers is so bad, that any expansion of credit above the level in which an impatient government is willing to repay would be too expensive to be attractive for a patient government. This ceases to be the case when the quality of the pool of borrowers improves. Namely, for  $\pi \geq \bar{\pi}_1$ , a patient government becomes interested in borrowing at the current rates ( $\tilde{r} = \frac{i\tilde{L}-(1-\pi)\phi\gamma w}{\pi\tilde{L}}$ ) but quantities ( $\tilde{L} = \frac{\gamma w}{r-\gamma\rho}$ ) remain rationed because of the binding default constraint (of the patient government). When the quality of the pool of borrowers further improves, then the patient government's default is no more an issue, and sovereigns can borrow up to  $K$  being charged an interest rate ( $\tilde{r}_k = \frac{iK-(1-\pi)\phi\gamma w}{\pi K}$ ) that converges to the risk free rate when  $\pi$  goes to one.

Figure 4 deals with the case in which the country's absorptive capacity is relatively low ( $K < \frac{\gamma w}{i(1-\gamma)}$ ) and thus the demand for credit by a patient government is limited. In this case the no-default constraint does not bind and, as soon as the latter finds it interesting to borrow ( $\pi \geq \bar{\pi}_2$ ), at the risk adjusted interest rate ( $\tilde{r}_k$ ), it can borrow as much as it needs ( $K$ ).

Summing up our findings, if the probability that a government is patient is low ( $\pi \leq \bar{\pi}$ ), the credit constraint it faces is particularly severe. If this is the case, the interest rate required by private lenders deters patient governments from borrowing more than the amount that impatient governments obtain under full information.

However, patient governments can be credit constrained even in the case in which the distribution of types is not so skewed. In this case ( $\pi > \bar{\pi}$ ), patient governments still may not be able to borrow the amount that they would obtain under full information and do pay a higher interest rate. It is also worth noting that the market provides impatient governments with an amount of funds greater than under full information and this is a main source of distortion. Finally, as expected, the more the borrower can recover in the case of default (the higher  $\phi$ ) the greater the market access for the developing country.

## 5.2 Offering the choice between aid and debt relief

Patient governments value debt relief more than impatient ones as debt relief allows them to access international capital markets and thus obtain the resources they need to fund investment projects.<sup>13</sup> Thus, the choice between aid and debt relief may convey information about the time preferences of

<sup>12</sup>In particular, we assume that  $\gamma = .3$ ,  $w = .2$ ,  $i = 1.1$ ,  $\rho = 2$ ,  $\phi = 0.5$ ;  $K = .1$ , and  $K = .07$  respectively, in Figure 3, and Figure 4.

<sup>13</sup>We continue to focus on the interesting case that  $\gamma w < iK$ . If this were not so, both governments would choose debt relief.

a debtor government and thus help channel private funds to the governments that want to invest. This opens up the possibility for the donor community to screen out debtors by offering the choice between full debt relief and aid.

In what follows, we show that a scheme that offers the choice between aid and debt relief can help screening patient from impatient governments. In particular, we prove the existence of a separating equilibrium where debt relief is chosen by the patient government, and aid by the impatient government. As the choice of debt relief identifies a government of type  $j = h$ , such a choice allows a patient government to borrow from the capital market the same amount of new funds,  $\hat{L} \equiv \min\{\frac{\gamma w}{i - \gamma \rho}; K\}$ , that it would obtain under full information. As standard in screening models, the amount of aid that must be offered to an impatient government to choose this option and reveal its type cannot be lower than  $\hat{L}$ .

Formally, we have the following result:

**Proposition 2** *If the country absorptive capacity is limited ( $K < \frac{\gamma w}{i - \gamma \rho}$ ) and donors offer governments the choice between debt relief and aid (in an amount equivalent to the borrowing capacity of a patient government, that is  $\hat{A} = K$ ), the impatient government chooses aid, and the patient one debt relief.*

**Proof:** In Appendix

**Corollary 1** *In the situation above, if donors offer only aid, both types of government default on their debt, and for all levels of aid  $A \leq K$  the utility of a patient government is lower than in the case donors offer the choice between aid and debt relief.*

**Proof:** In Appendix

The intuition behind Proposition 2 is the following. As long as the (unconstrained) demand for investment funding by a patient government is limited, the latter would prefer debt relief to a comparable amount of aid since debt relief allows it to avoid default and to retain the profits of its investment. Indeed, debt relief allows a patient government to repay the new loans and offers it the opportunity to build a good creditor reputation. As standard in adverse selection models, in order to screen patient and impatient governments, the impatient ones should somehow be “bribed,” in this case through generous amounts of aid.

Corollary 2 clarifies that a policy of only aid cannot replicate the allocation of resources of a policy that offers the choice between aid and debt relief, even if  $A = K$ , because a patient government defaults on its debt. It follows directly from the previous proposition that a patient government strictly prefers debt relief to aid and thus that its utility with a policy of only aid is lower than its utility with a policy of aid or debt relief, while the utility of an impatient government is the same.

## 6 Optimal Assistance Policy

Having discussed how three alternative strategies to promote development —only debt relief, aid or debt relief, only aid— may affect countries’ incentives, in this section we look at the optimal assistance policy from the point of view of donors. Obviously, the policy is optimal in relation

to official donors' specific objective functions. Moreover, as different policies have different costs in term of resources transferred to debtor countries, the donors' optimal choice depends on the resources available to them.

We assume that donors maximize developing countries long term consumption, that is, the difference between second-period consumption with and without intervention. Such an objective is in line with the view that the purpose of official assistance is to create opportunities for development and not to foster current consumption that often creates political patronage that ends up keeping the country stuck in a low-growth equilibrium.

Donors' maximization also depends upon the cost ( $C$ ) of the policy. Assuming, without great loss of generality, that  $C$  is quadratic in the amount of resources,  $B$ , devoted to development assistance, we have that

$$MaxV = \frac{\pi c_1^h + (1 - \pi)c_1^l}{i} - \frac{\beta}{2}B^2. \quad (6)$$

In what follows, we focus on the interesting case where the policy that offers the choice between aid and debt relief allows to separate the two types of government, that is, on the case in which  $K < \frac{\gamma w}{i - \gamma \rho}$ , and  $\hat{L} = K$ . We also assume that the present value of debt relief is equal to the market value of the old debt in the absence of debt relief discounted to period  $t = 0$  (for donors we use the risk-free rate as the discount factor). Since, by Lemma 1 part (ii), both types of government default in the absence of assistance, then the present market value of  $D$  is equal to  $\frac{\phi \gamma w}{i}$ , that is, to the present value of the resources that creditors can appropriate in case of default.

The three policies, where subscripts  $AR$ ,  $R$ , and  $A$  stand respectively for aid-or-debt-relief, only debt relief, and only aid, have the following costs:

$$C_{AR} = \frac{\beta}{2} \left[ \pi \frac{\phi \gamma w}{i} + (1 - \pi)K \right]^2 \quad (7)$$

$$C_R = \frac{\beta}{2} \left[ \frac{\phi \gamma w}{i} \right]^2 \quad (8)$$

$$C_A = \frac{\beta}{2} \left[ \pi \left( 1 - \frac{\phi \gamma \rho}{i} \right) A + (1 - \pi)A \right]^2 \quad (9)$$

Interestingly, (9) shows that the aid provided to patient governments is cheaper than the one provided to impatient governments. This is because aid is invested (up to  $K$ , see Lemma 1), and it increases the amount of resources that can be appropriated by donors in the case of default on the old debt,  $D$ . It is also worth noting that the maximum amount of aid that donors would ever provide is equal to  $K$  because any amount of aid in excess of  $K$  would not be invested, while it would increase the cost of assistance.

From a simple inspection of equations (7)-(9) it is easy to ascertain that the cost of an aid-or-debt-relief policy,  $C_{AR}$ , is greater than the cost of a policy of only debt relief,  $C_R$ ,<sup>14</sup> while the cost of a policy of only aid,  $C_A$ , necessarily depends on the total amount of aid  $A \leq K$ , and decreases with the recovery rate  $\phi$ .

Donors' objective function in the case of only debt relief, is given by<sup>15</sup>

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<sup>14</sup>This follows directly from (A.6).

<sup>15</sup>Note that, if  $K < \frac{\gamma w}{i - \gamma \rho}$ , then  $\hat{\pi} < 1$ .

$$V_R = \begin{cases} \frac{\pi}{i} [(\rho - i)\frac{\gamma w}{i} + \gamma w] - \frac{1}{2}\beta(\frac{\phi\gamma w}{i})^2 & \text{if } K \geq \frac{\gamma w}{i(1-\gamma)} \quad \text{and } \pi \leq \bar{\pi}_1 \\ \frac{\pi}{i} [(\rho - \tilde{r}_L)\tilde{L} + \gamma w] - \frac{1}{2}\beta(\frac{\phi\gamma w}{i})^2 & \text{if } K \geq \frac{\gamma w}{i(1-\gamma)} \quad \text{and } \bar{\pi}_1 < \pi \leq \hat{\pi} \\ \frac{\pi}{i} [(\rho - \tilde{r}_k)K + \gamma w] - \frac{1}{2}\beta(\frac{\phi\gamma w}{i})^2 & \text{if } K \geq \frac{\gamma w}{i(1-\gamma)} \quad \text{and } \pi > \hat{\pi} \\ \frac{\pi}{i} [(\rho - i)\frac{\gamma w}{i} + \gamma w] - \frac{1}{2}\beta(\frac{\phi\gamma w}{i})^2 & \text{if } K < \frac{\gamma w}{i(1-\gamma)} \quad \text{and } \pi \leq \bar{\pi}_2 \\ \frac{\pi}{i} [(\rho - \tilde{r}_k)K + \gamma w] - \frac{1}{2}\beta(\frac{\phi\gamma w}{i})^2 & \text{if } K < \frac{\gamma w}{i(1-\gamma)} \quad \text{and } \pi > \bar{\pi}_2 \end{cases} \quad (10)$$

where the different cases map the different segments depicted in Figure 3 and 4. For the cases of aid-or-debt-relief, and only aid donors' objective functions are instead given by

$$V_{AR} = \frac{\pi}{i} [(\rho - i)K + \gamma w] - \frac{1}{2}\beta \left[ \pi \frac{\phi\gamma w}{i} + (1 - \pi)K \right]^2, \quad (11)$$

$$V_A = \frac{\pi}{i} \rho(1 - \gamma)A^* - \frac{1}{2}\beta \left[ \pi(1 - \frac{\phi\gamma\rho}{i})A^* + (1 - \pi)A^* \right]^2; \quad (12)$$

where  $A^* = \min\{\arg \max_A V_A; K\}$ .

Our main findings are summarized in the following Proposition:

**Proposition 3** (i) *If the probability that the recipient government is patient,  $\pi$ , is high and the cost of assistance,  $\beta$ , is low, then a policy of aid-or-debt-relief is optimal; (ii) for a lower probability that the government is patient and a higher cost of assistance, donors prefer a policy of only debt relief; (iii) (very limited) aid is the preferred policy only for a high cost of assistance, and/or a low probability that the government is patient.*

**Proof:** In Appendix

Let now try to get a better understanding of the Proposition with the help of Figure 5 and 6 where we plot donors' objective function under the three regimes for different values of the cost of assistance (low  $\beta = 1$ , medium  $\beta = 10$ , and high  $\beta = 100$ ) both in the case of relatively high and low absorptive capacity (Figure 5 and 6, respectively).<sup>16</sup>

– Insert Figure 5 and 6 –

To start with, remember that the second-period increase in a patient government consumption with an aid-or-debt-relief policy is, trivially, higher than with a policy only-debt relief, and higher than with a policy of only aid because of Corollary 1. Notice further, that the expected utility associated with an aid-or-debt-relief policy increases while its expected cost decreases with  $\pi$ . This means that if the probability,  $\pi$ , that the government is patient is sufficiently high, and the cost of assistance,  $\beta$ , is low, offering the choice between aid or debt relief is necessarily the best policy. Indeed, since an aid-or-debt-relief policy is the most efficient but costliest way of providing assistance, it is more likely to be the preferred one when donors are generous ( $\beta = 1$ ) and the pool

<sup>16</sup>We use the same parametrization as in Figure 3 and 4.

of good borrowers is large. When instead such pool is small, aid-or-debt relief becomes less and less an interesting option, and is dominated by debt relief for intermediate values of  $\pi$ , or by aid for very low values of  $\pi$ . Of course, the threshold values for the different cases depend on the cost of aid,  $\beta$ . The higher is such cost, the more appealing is the aid policy (which becomes increasingly less generous when  $\pi$  becomes small) and less so the aid-or-debt-relief policy.

Indeed, when the cost of assistance is very high ( $\beta = 100$ ), no matter how good is the pool of borrowers, an aid-or-debt-relief policy (that we know to be the costliest) is dominated by the other two policies. Actually, when  $\beta$  tends to infinity, the cost of a policy of only aid can be driven to zero by reducing aid to zero, while both debt relief and aid-or-debt-relief entail a positive cost. This means that if the probability that the government is patient is low, cost considerations prevail, and very little aid is necessarily the best policy, while if such probability is high enough, debt relief is donors' preferred option. This is clearly depicted in Panel c where aid is the optimal choice for low values of  $\pi$ , while debt relief is optimal for higher values of  $\pi$ , that is when donors want to provide market access but the cost of separating is too high.

Finally, for intermediate costs of assistance ( $\beta = 10$ ), the optimal policy depends on the probability that the government is patient. As it is clearly shown in Panel b, if this probability is low, aid is again preferred by donors, while a policy of only debt relief is optimal for intermediate values of  $\pi$ , where donors want to provide market access but the cost of separating is too high. A policy of aid-or-debt relief prevails only for high values of  $\pi$ , when the pool of good borrowers is large enough to make the expected returns from this policy sufficiently high and its cost sufficiently low.

## 7 Partial versus Full Debt Relief

In our discussion of optimal development assistance, we have sidestepped one important issue: that of partial versus full debt relief, implicitly assuming that granting as much relief as possible would be optimal for donors. However, if resources for developmental assistance are costly, partial debt relief becomes a policy option to consider.

We have explored this case and found that (partial) debt relief must be substantial for an aid-or-partial-debt-relief offer to be able to separate the two types of governments. In particular, the debt write off should not only make the remaining debt sustainable in the absence of new private loans, but also be large enough to make a patient government willing to repay both the new and the old unforgiven debt. When this is the case, and the probability of a patient government is sufficiently high, a policy of generalized full relief can be compared to a policy of aid-or-partial-relief of the same or even lower cost. It turns out that if the two policies have the same cost, they also yield the same utility, while a less costly aid-or-partial-relief contract yields a lower second period consumption. This implies that the trade off between the higher consumption and the greater cost of a separating offer cannot be escaped by granting only partial debt relief. The reason is that the savings from partial relief come at the cost of redistributing resources away from patient governments, which offsets the efficiency gains of the separating contract.

Finally, suppose that the cost of implementing a separating aid-or-partial relief policy is too high. Although the amount of debt relief falls below the minimum needed for separation, a generalized partial-relief policy could still be viable. This can be the case if the absorptive capacity is relatively high, and thus separation too costly; and, more importantly, if debt relief is large enough to make the remaining debt sustainable. Then, the issue is whether generalized partial relief can do better than aid. Noting that the cost of partial debt relief can be driven to zero when the unsustainable



portion of the debt is written off, a policy of generalized partial relief can be compared to a policy of only aid with the same cost. Interestingly, it turns out that with a policy of generalized partial relief the patient government is always rationed, but its second period consumption is nevertheless greater than with a policy of only aid of the same cost. Hence, when a separating aid-or-debt-relief contract cannot be offered, official donors should always prefer a policy of generalized partial relief to a policy of only aid.

To conclude, our discussion of partial relief suggests that optimal assistance policy should be restricted to the choice between an aid-or-debt relief policy and a policy of generalized debt-relief; which one is best depends on the trade off between current costs and future consumption.

## 8 Conclusion

The idea that debt relief is an effective strategy in helping developing countries reaching the MDGs has been very popular among policymakers in the last decade. However, among economists, doubts remained about whether debt relief is necessarily the most efficient way of providing developmental assistance to poor (and indebted) countries.

If donors consider aid and debt relief to a large extent as substitutes, debt relief may not increase the net flow of resources to HIPC. If this were the case, the key question is not whether debt relief is good for growth (or poverty reduction) but whether it is better than other forms of assistance. As it is well known in the literature, in the realm of developmental policies there are no one-size-fits-all solutions and the relative effectiveness of different policies depends on countries' characteristics.

There are no doubts in our mind that in presence of a debt overhang, debt relief is a very powerful way of providing assistance. However, this does not mean that providing debt relief to all indebted countries is the most effective way to create market access to countries that deserve it. In some countries, high indebtedness could reflect a high discount factor. In this case, debt forgiveness would just create the condition for the accumulation of new (unsustainable) debt. Other countries, instead, could be willing to invest in long-term developmental project but cannot because of their debt overhang. This brings us to the main question of this paper: Is it possible to use assistance policies to "separate" creditworthy from non-creditworthy countries?

Our answer is *yes, but* it can be costly. The reason is that to allow creditworthy countries to build their good borrowers' reputation, one needs to compensate "impatient" governments with large amounts of aid. The cost of such compensation depends on how good the pool of countries is. This means that we should expect an aid-or-debt-relief policy in place when donors are willing to commit a substantial amount of resources to developmental assistance and/or developing countries are likely to invest in long term projects.

When donors have little resource to fund developmental assistance, then the donors' choice is between limited aid or debt relief. The problem with either choice is that it makes it difficult and costly to potentially creditworthy countries to build a credit history. This means that they can remain severely credit rationed for a while. If this were the case, a generalized debt relief policy would self-defeat the very rationale of debt relief: to allow market access to countries that deserve it!

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## Proofs

### *Proof of Lemma 1*

(i) Let first consider the case of a government of type  $j = l$ . If it does not default, its utility can be written as:

$$U_{ND}^l = w + A + L - I + d^l[w + \rho \min\{I; K\} - rL - D] \quad (13)$$

subject to  $A + L - I \geq 0$ . Since  $\frac{\partial U_{ND}^l}{\partial I} \leq -1 + \rho d^l$  (with the equality sign for  $I \leq K$ ), it follows from assumption (A.3) that  $\frac{\partial U_{ND}^l}{\partial I} < 0$ . Assume now that it defaults. Its utility can be written as:

$$U_D^l = w + A + L - I + d^l(1 - \gamma)[w + \rho \min\{I; K\}] \quad (14)$$

subject to  $A + L - I \geq 0$ . Again, assumption (A.3) guarantees that  $\frac{\partial U_D^l}{\partial I} < 0$  and that no investment occurs.

Consider now a government of type  $j = h$ . If it does not default, its utility can be written as:

$$U_{ND}^h = w + A + L - I + d^h[w + \rho \min\{I; K\} - rL - D]; \quad (15)$$

while if it defaults as:

$$U_D^h = w + A + L - I + d^h(1 - \gamma)[w + \rho \min\{I; K\}]. \quad (16)$$

subject to  $A + L - I \geq 0$ .

Assumption (A.4) now insures that both in the case of default and not default  $\partial U^h / \partial I \geq 0$  if and only if  $I \leq K$ . Hence, if  $L > K - A$  a patient government invests  $I = K$  and consumes  $A + L - K$  in period  $t = 0$ , while if  $L \leq K - A$  the government invests all the external resources  $A + L$  that it receives in period  $t = 0$ . Q.E.D.

(ii) Consider first a government of type  $j = l$ . From part (i), this government consumes all the resources it receives in period  $t = 0$ . Hence, it will default if  $(1 - \gamma)w > w - rL - D$ , or

$$\gamma w < D + rL \quad (17)$$

which is always verified because of assumption (A.1).

Consider, now, a government of type  $j = h$ . From part (i), if  $L \leq K - A$ , this government invests all the resources it receives in period  $t = 0$ . In the absence of debt relief, it will default if  $(1 - \gamma)[w + \rho(A + L)] > w + \rho(A + L) - rL - D$ , or, for  $A = 0$

$$\gamma w < D + rL - \gamma \rho L \quad (18)$$

which is always the case because of assumptions (A.1) and (A.2) and the fact that  $r \geq i$ . In the case  $L > K - A$ , from part (i) we know that the government will only invest  $K$ . It is easy to check that the condition for defaulting is a weaker one which is a fortiori satisfied so that, without aid, both types of government would default on the debt,  $D$ , in period  $t = 1$  and thus would not be able to borrow from private lenders.

(iii) Assume that a government of type  $j = h$  does not default. From part (i), we know that the utility of the government is increasing in the amount it borrows as long as  $L \leq K - A$ . Should it borrow more, its utility would be equal to:

$$U_{ND}^h = w + A + L - K + d^h[w + \rho K - rL - D]. \quad (19)$$

However, from assumption (A.4) we have  $\frac{\partial U^L}{\partial L} = 1 - rd^h < 0$  so that the government will never demand  $L > K - A$ .

Assume now that a government of type  $j = h$  defaults. If  $L \geq K - A$ , its utility can be written as:

$$U_D^h = w + A + L - K + d^h(1 - \gamma)[w + \rho K]. \quad (20)$$

which is strictly increasing with new loans,  $L$ . However, private lenders would never offer an amount of loans greater than  $L^{max} = \frac{1}{r}[\gamma(w + \rho K) - D]$ , (zero if  $L^{max} < 0$ ). This is the amount of loans that makes the government indifferent between repaying and defaulting, i.e.  $w + \rho K - rL^{max} - D = (1 - \gamma)(w + \rho K)$ .

It follows that a government of type  $j = h$  strictly prefers to demand  $L = K - A$  so as to maximize  $U_{ND}^h$  and to not default. Finally, notice that private lenders would never lend any amount greater than  $L = K - A$  because only a government of type  $j = l$  would be interested in borrowing more than  $L = K - A$  and defaulting. It follows that the maximum amount of loans that a government of any type may obtain is equal to  $L = K - A$ .

#### *Proof of Proposition 1*

First of all notice from equation (17) that the maximum amount of new loans that a government of type  $j = l$  repays after debt relief is given by  $\bar{L} \equiv \frac{\gamma w}{i}$ . Thus, if  $K \leq \bar{L}$ , a government of type  $j = l$  demands and obtains an amount of loans equal to  $\bar{L}$ , while, from Lemma 1 part (iii), a government of type  $j = h$  demands and obtains an amount of loans equal to  $K$ . Because both governments repay these loans, they are offered at the risk free rate,  $i$ . We rule out this possibility with assumption (A.6). Consider now the interesting case that  $K > \bar{L}$ . If the amount of new loans is  $L$ , with  $\bar{L} < L \leq K$ , a government of type  $j = l$  will always default and renegotiate the debt in period  $t = 1$  while a government of type  $j = h$  will service it as long as  $\gamma(w + \rho L) \geq rL$ . Also notice, from Lemma 1 part (iii), that private lenders never offer an amount of loans greater than  $K$ , as loans in excess of  $K$  would be demanded only by governments that want to default in period  $t = 1$ . It follows that a policy of generalized debt relief would lead private lenders to offer new loans up to a level

$$\tilde{L} \equiv \min \left\{ \frac{\gamma w}{r - \gamma \rho}; K \right\}. \quad (21)$$

Because the capital market is competitive and lenders are risk neutral, the break-even interest rate on loans  $\tilde{L}$  is implicitly defined as  $\pi r \tilde{L} + (1 - \pi)\phi \gamma w = i \tilde{L}$  and is thus equal to

$$\tilde{r} = \frac{i \tilde{L} - (1 - \pi)\phi \gamma w}{\pi \tilde{L}}. \quad (22)$$

Substituting  $\tilde{r}$  for  $r$  in equation (21), and solving, the amount of loans,  $\tilde{L}$ , offered at the interest rate  $r = \tilde{r}$  is equal to

$$\tilde{L} \equiv \min \left\{ \frac{\gamma w [\pi + (1 - \pi)\phi]}{i - \pi \gamma \rho}; K \right\}, \quad (23)$$

if  $\tilde{L} > \bar{L}$ , and to  $\bar{L}$  otherwise (see below).

If  $\tilde{L} = \frac{\gamma w[\pi + (1-\pi)\phi]}{i - \pi\gamma\rho} < K$ , then the interest rate is equal to  $\tilde{r}_L = \frac{i + (1-\pi)\phi\gamma\rho}{\pi + (1-\pi)\phi}$ .  
 If instead  $\tilde{L} = K < \frac{\gamma w[\pi + (1-\pi)\phi]}{i - \pi\gamma\rho}$ , then the maximum amount of loans is  $K$ , and the interest rate is equal to  $\tilde{r}_k = \frac{iK - (1-\pi)\phi\gamma w}{\pi K}$ .

Consider now the decision to borrow by a government of type  $j = h$ . As this government maximizes its second period consumption,  $c_1^h = w + \rho L - rL$ , subject to  $L \leq \tilde{L}$ , and  $\lim_{L \rightarrow \bar{L}} r = i$ , it demands new loans  $\tilde{L} > \bar{L}$ , if, and only if,

$$\begin{aligned} \left. \frac{\partial c_1^h}{\partial L} \right|_{L \geq \tilde{L}} &= \rho - r - \frac{\partial r}{\partial L} L = \rho - \frac{i}{\pi} > 0, \quad \text{and} \\ c_1^h(\tilde{L}) &> w + (\rho - i) \frac{\gamma w}{i}. \end{aligned} \quad (24)$$

There are two cases to consider:

i) If  $K \geq \frac{\gamma w}{i(1-\gamma)}$ , we have that

$$c_1^h(\tilde{L}, \tilde{r}_L) > w + (\rho - i) \frac{\gamma w}{i} \iff \pi > \bar{\pi}_1 \equiv \frac{i\gamma + i(1-\phi)(1-\gamma)}{\rho\gamma + i(1-\phi)(1-\gamma)} < 1.$$

We further have that  $\tilde{L}(\bar{\pi}_1) = \frac{\gamma w}{i(1-\gamma)} \leq K$ .

Finally, it is easy to check that  $\tilde{L} = K$  and  $\tilde{r}_L = \tilde{r}_k \iff \hat{\pi} = \frac{iK - \phi\gamma w}{\gamma\rho K + (1-\phi)\gamma w}$ . We thus have that

$$L = \begin{cases} \frac{\gamma w}{i} & \text{if } \pi \leq \bar{\pi}_1; \\ \frac{\gamma w[\pi + (1-\pi)\phi]}{i - \pi\gamma\rho} & \text{if } \bar{\pi}_1 < \pi \leq \min\{1, \hat{\pi}\}; \\ K & \text{if } \hat{\pi} < 1 \text{ and } \pi > \hat{\pi}; \end{cases}$$

$$r = \begin{cases} i & \text{if } \pi \leq \bar{\pi}_1; \\ \tilde{r}_L & \text{if } \bar{\pi}_1 < \pi \leq \min\{1, \hat{\pi}\}; \\ \tilde{r}_k & \text{if } \hat{\pi} < 1 \text{ and } \pi > \hat{\pi}. \end{cases}$$

ii) If  $K < \frac{\gamma w}{i(1-\gamma)}$ , at  $\pi = \bar{\pi}_1$ , we have that  $\tilde{L} = K < \frac{\gamma w[\bar{\pi}_1 + (1-\bar{\pi}_1)\phi]}{i - \bar{\pi}_1\gamma\rho}$ . It is then easy to check that

$$c_1^h(K, \tilde{r}_k) > w + (\rho - i) \frac{\gamma w}{i} \iff \pi > \bar{\pi}_2 \equiv \frac{i(iK - \gamma w) + i(1-\phi)\gamma w}{\rho(iK - \gamma w) + i(1-\phi)\gamma w} < 1.$$

We thus have that

$$L = \begin{cases} \frac{\gamma w}{i} & \text{if } \pi \leq \bar{\pi}_2 \\ K & \text{if } \pi > \bar{\pi}_2 \end{cases} \quad \text{and} \quad r = \begin{cases} i & \text{if } \pi \leq \bar{\pi}_2 \\ \tilde{r}_k & \text{if } \pi > \bar{\pi}_2 \end{cases}$$

Finally notice that  $\frac{\partial \bar{\pi}_1}{\partial \phi} < 0$  and  $\frac{\partial \bar{\pi}_2}{\partial \phi} < 0$ .

*Proof of Proposition 2*

From equation (21), we know that the maximum loan that a patient government ( $j = h$ ) demands and receives from the market when its type is known is equal to  $\widehat{L} = \min\{\frac{\gamma w}{i - \gamma \rho}; K\}$ .

Then, assume that a government that chooses debt relief receives a loan  $\widehat{L}$ . If this is the case, the impatient government ( $j = l$ ) is indifferent between an amount of aid  $\widehat{A} = \widehat{L}$ , and debt relief. In fact, if the impatient government choosed debt relief and were believed of type  $j = h$ , it would obtain an amount of loans exactly equal to  $\widehat{L}$ . In either cases it would always consume all the available resources in period  $t = 0$  and default on the old, or on the new debt, in period  $t = 1$ , at the same cost  $\gamma w$ .

Consider now a patient government that chooses debt relief and is believed of type  $j = h$ . As before it will invest all resources it receives. Its utility is then equal to

$$U^h(DR) = w + d^h[w + \rho \widehat{L} - i \widehat{L}], \quad (25)$$

where  $(DR)$  stands for debt relief, and  $(A)$  for aid.

Then, consider the case in which the patient government chooses aid,  $\widehat{A} = \widehat{L}$ , and it is believed of type  $j = l$  so that it does not receive any new credit. Two cases must be considered.

i) Suppose that the government repays the old debt  $D$ . Its utility would be equal to

$$U_{ND}^h(A) = w + d^h[w + \rho \widehat{L} - D], \quad (26)$$

and it would be lower than the utility from choosing debt relief as, from assumption (A.5), we have that  $D > iK \Rightarrow D > i\widehat{L} \Rightarrow U^h(DR) > U_{ND}^h(A)$ .

ii) Suppose that the government defaults. Then, its utility would be equal to

$$U_D^h(A) = w + d^h(1 - \gamma)(w + \rho \widehat{L}), \quad (27)$$

which is lower than the utility from choosing debt relief if  $\widehat{L} = K < \frac{\gamma w}{i - \gamma \rho}$ , that is, if the country absorptive capacity is limited. Q.E.D.

*Proof of Corollary 1*

If donors offer only aid, a patient government ( $j = h$ ) invests, at most,  $K$ . Then, from equations (26)-(27) and part (iii) of Lemma 1, this government defaults if

$$D > \gamma w + \gamma \rho K,$$

which is always the case for  $K = \frac{\gamma w}{i - \gamma \rho}$ , because of assumption (A.5), and thus for any  $K < \frac{\gamma w}{i - \gamma \rho}$ . Of course, an impatient government ( $j = l$ ) also defaults as it never invests. The fact that the patient government strictly prefers debt relief for  $A \leq K$  follows from  $\frac{\partial U_D^h(A)}{\partial A} > 0$  and  $K < \frac{\gamma w}{i - \gamma \rho} \Rightarrow U_D^h(A = K) < U^h(DR)$ . Q.E.D.

*Proof of Proposition 3*

First, notice that the amount of aid,  $A^*$ , that donors provide with a policy of only aid depends on  $\beta$ . Since  $K$  is the maximum amount of aid that donors would provide, we have that  $A^*$  is equal to  $K$ , for  $\beta \leq \bar{\beta} \equiv \frac{i\pi\rho(1-\gamma)}{(i-\pi\phi\gamma\rho)^2K}$ , and it decreases with  $\beta$  for  $\beta > \bar{\beta}$ . Hence, from Corollary 1,



the increase in second-period consumption that can be obtained with an aid-or-debt-relief policy is always greater than with a policy of only aid, while it is trivially greater than with a policy of only debt relief.

Two cases should be distinguished:  $\beta \leq \bar{\beta} \equiv \frac{i\pi\rho(1-\gamma)}{(i-\pi\phi\gamma\rho)^2K}$ , and  $\beta > \bar{\beta}$ .

Assume  $\beta \leq \bar{\beta}$

(i) The difference in the utility from second period consumption between an aid-or-debt-relief policy and a only-aid policy is equal to zero at  $\pi = 0$  and increases with  $\pi$ . The cost differential, between these two policies,  $C_{AR} - C_A$ , depends on  $\phi$ . If  $\phi \leq \bar{\phi} \equiv \frac{iK}{\gamma w + \gamma \rho K}$ , then  $C_{AR} \leq C_A$  so that donors strictly prefer a policy of aid-or-debt-relief to a policy of only aid. If, instead,  $\phi > \bar{\phi}$ , the cost differential,  $C_{AR} - C_A$ , is equal to zero at  $\pi = 0$ , is positive for  $\pi > 0$ , and increases with  $\pi$ . Since the utility differential does not depend on  $\beta$ , while the cost differential,  $C_{AR} - C_A$ , tends to zero as  $\beta \rightarrow 0$ , there exists, for any  $\pi > 0$ , a sufficiently low  $\beta$  such that donors prefer a aid-or-debt-relief policy to a policy of only aid. Furthermore, since the utility differential from second-period consumption increases linearly with  $\pi$  while the cost differential is concave in  $\pi$ , the range of values of  $\beta$  for which donors prefer an aid-or-debt-relief policy increases with  $\pi$ .

Consider now the choice between a policy of aid-or-debt-relief and a policy of only debt relief. The difference in the utility from second period consumption between these two policies is equal to zero at  $\pi = 0$ ; it reaches a maximum and, then, decreases linearly to zero as  $\pi \rightarrow 1$ . The cost differential between the two policies,  $C_{AR} - C_R$ , is positive at  $\pi = 0$ , it is convex in  $\pi$  and decreases to zero as  $\pi \rightarrow 1$ . Since the cost differential tends to zero as  $\beta \rightarrow 0$ , for any  $\pi > 0$  there exists a sufficiently low  $\beta$  such that the difference in the utility from second-period consumption is greater than the cost differential and a policy of aid-or-debt-relief is preferred to a policy of only debt relief. Finally, since the utility differential from second-period consumption tends linearly to zero as  $\pi \rightarrow 1$  while the cost differential tends to zero exponentially, the range of values of  $\beta$  for which donors prefer an aid-or-debt-relief policy increases with  $\pi$ . This proves (i).

(ii) If  $(1 - \gamma)iK < \gamma w$ , the utility from second-period consumption of a policy of only debt relief is always greater than the utility of a policy of only aid. Since the cost of debt relief,  $C_R$ , is lower than that of aid,  $C_A$ , if  $\pi \leq \frac{iK - \phi\gamma w}{\phi\gamma\rho K}$ , donors prefer a policy of only debt relief to a policy of only aid. Finally, notice from part (i), that a debt-relief policy is also preferred to an aid-or-debt-relief policy if  $\pi$  is sufficiently low.

If  $(1 - \gamma)iK \geq \gamma w$ , the difference in the utility from second period consumption between a policy of only aid and a policy of debt relief is equal to zero at  $\pi = 0$ , it increases with  $\pi$  reaching a maximum, and then it decreases linearly becoming negative for  $\pi > \hat{\pi}$ . On the other hand, the cost differential between the two policies,  $C_A - C_R$ , is positive at  $\pi = 0$ , and decreases exponentially with  $\pi$  becoming negative for  $\pi > \frac{iK - \phi\gamma w}{\phi\gamma\rho K} > \hat{\pi}$ . Hence, if  $\pi$  is sufficiently low a policy of only debt relief is preferred to a policy of only aid. Finally, since the cost differential,  $C_A - C_R$ , increases with  $\beta$ , as  $\beta \rightarrow \bar{\beta}$  the range of values of  $\pi$  for which donors prefer a policy of only debt relief increases. Since, from part (i) we know that a debt-relief policy is also preferred to a aid-or-debt-relief policy if  $\pi$  is sufficiently low, this conclude the proof for (ii).

Assume  $\beta > \bar{\beta}$

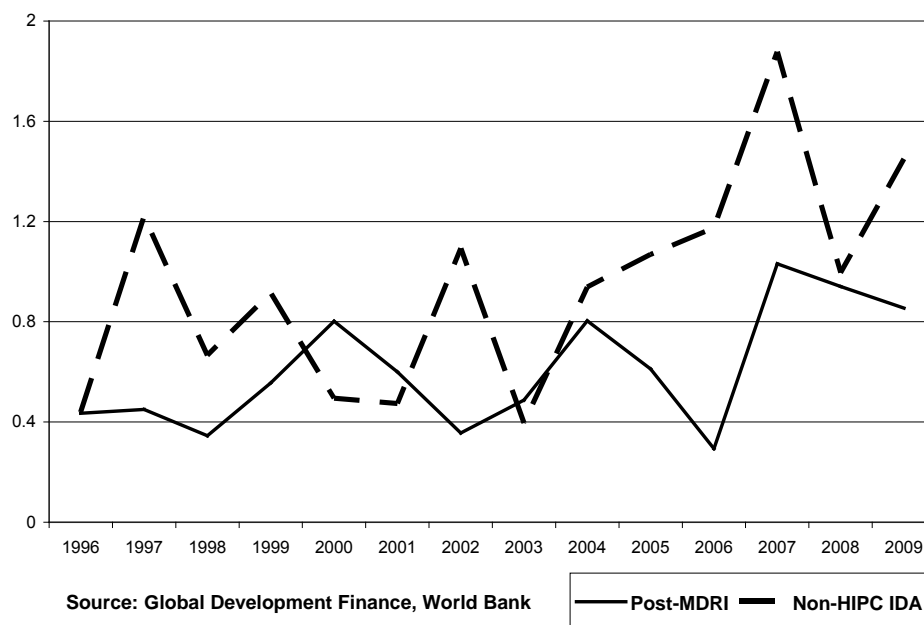
(iii) First, notice that when  $\beta > \bar{\beta}$  the amount of aid that donors provide with a only-aid policy is at the interior maximum  $A^* = \arg \max_A V_A = \frac{i\pi\rho(1-\gamma)}{\beta(i-\pi\phi\gamma\rho)^2}$ .

Consider, now, the choice between the three policies, and recall that donors should be willing

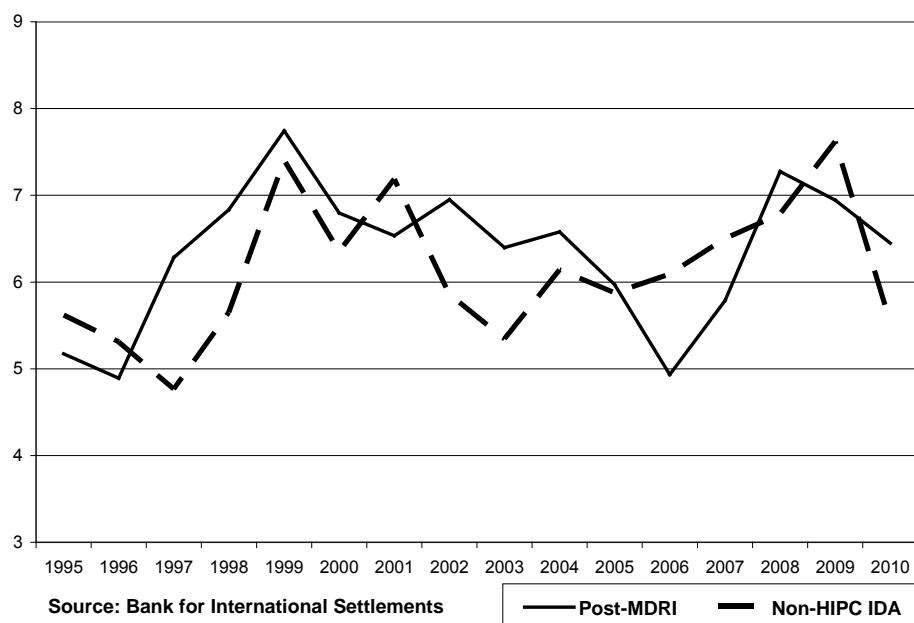
to commit a given amount of resources in order to implement a policy of aid-or-debt-relief or a policy of only debt relief. Thus, the costs of such policies,  $C_{AR} = \beta \frac{(B_{AR})^2}{2}$  and  $C_R = \beta \frac{(B_R)^2}{2}$  increase linearly with  $\beta$  (for any given  $\pi$  and  $\phi > 0$ ), so that the corresponding utilities,  $V_{AR}$  and  $V_R$ , become negative for large values of  $\beta$ . By contrast, the amount of aid,  $A^*$ , provided with a policy of only aid decreases with  $\beta$  offsetting the direct effect of  $\beta$  on its cost,  $C_R$ . As aid is set optimally, the utility of a policy of only aid, at  $\beta = \bar{\beta}$ , is equal to  $V_A = \frac{\pi}{2i} \rho(1 - \gamma)K$ , while it is equal to  $V_A = \frac{[\pi \rho(1 - \gamma)]^2}{2\beta[i - \pi \phi \gamma \rho]^2}$  for  $\beta > \bar{\beta}$ . Hence, the utility of a policy of only aid is always positive with  $\lim_{\beta \rightarrow \infty} V_A = 0$ , while  $\lim_{\beta \rightarrow \infty} V_{AR} = \lim_{\beta \rightarrow \infty} V_R = -\infty$ .

It follows that there always exists a sufficiently high  $\beta$  such that only-aid is the preferred policy. Finally, it is easy to check that when  $\lim_{\pi \rightarrow 0} V_A = 0$ , while  $\lim_{\pi \rightarrow 0} V_{AR} < 0$ , and  $\lim_{\pi \rightarrow 0} V_R < 0$

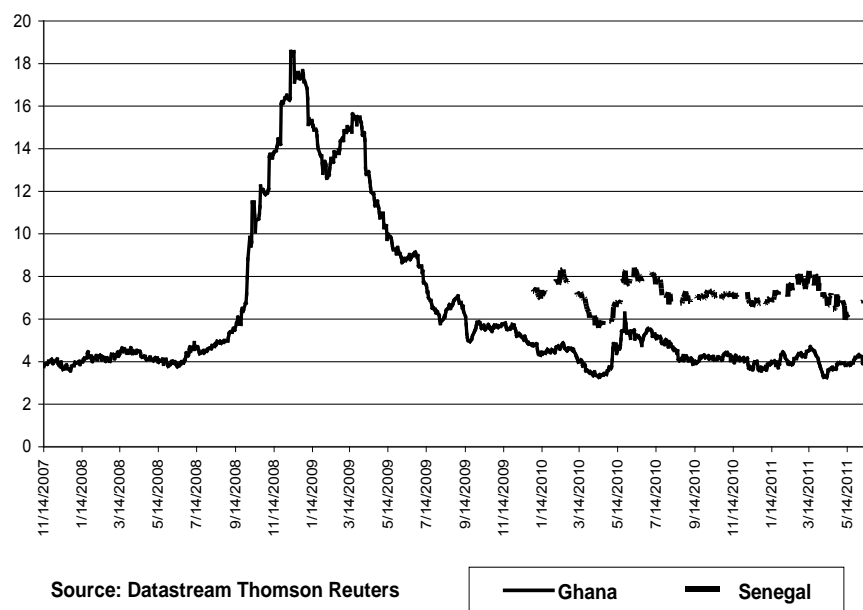
**Figure 1a: Private Capital Inflows (Loans and Bonds)  
percent of GDP - unweighted averages  
Post-MDRI versus Non-HIPC IDA countries**



**Figure 1b: Total International Claims of BIS-Reporting Banks  
percent of GDP - unweighted averages  
Post-MDRI versus Non-HIPC IDA Countries**



**Figure 2a: Ghana and Senegal Bond Yield Spreads on US Treasuries**



**Figure 2b: Interest Rates on New Debt - Post-MDRI Countries**  
Private vs. Official Rates on Loans and Bonds (Public and P.Guaranteed)

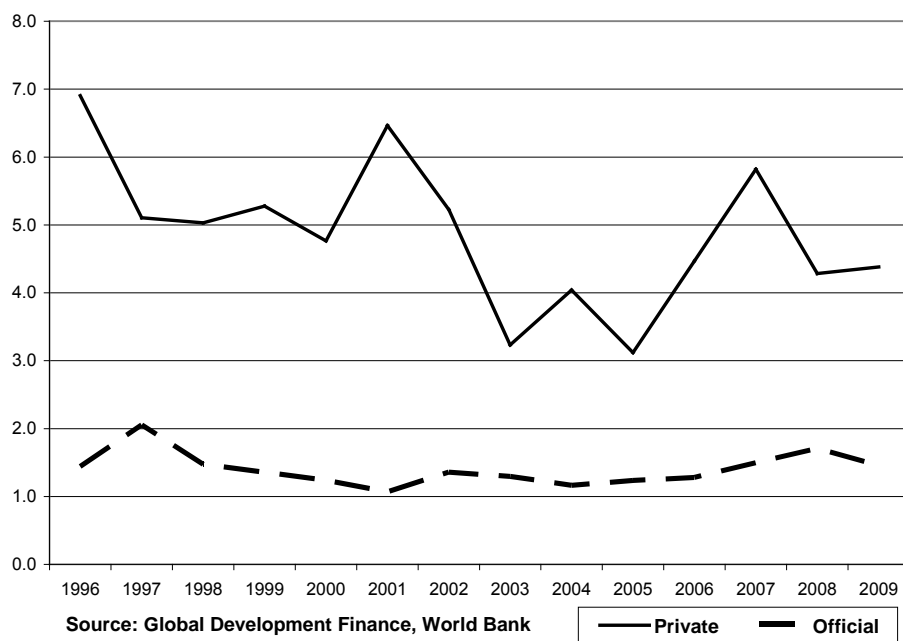
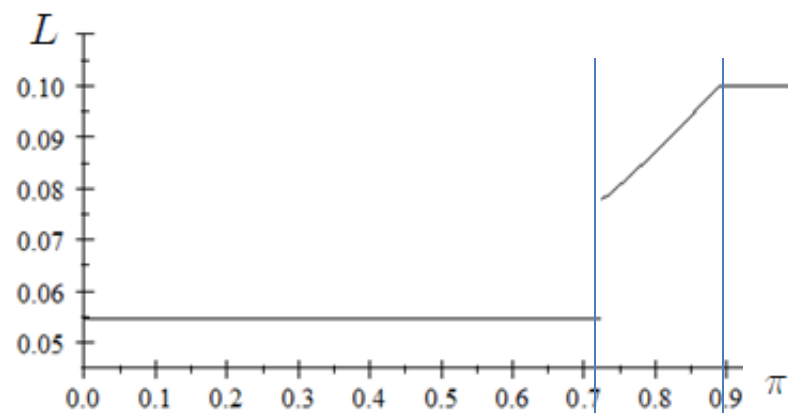
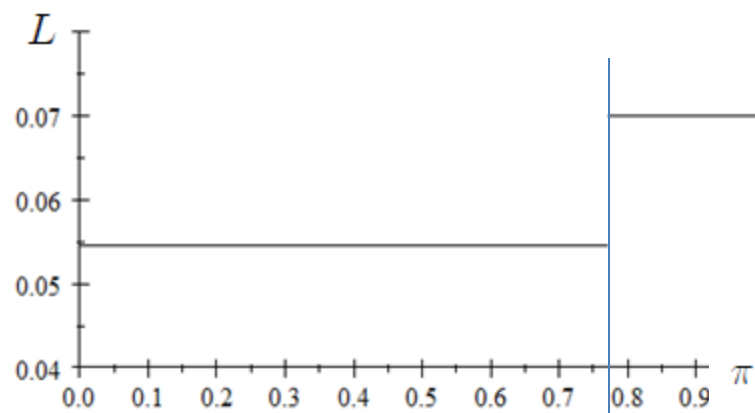


Figure 3

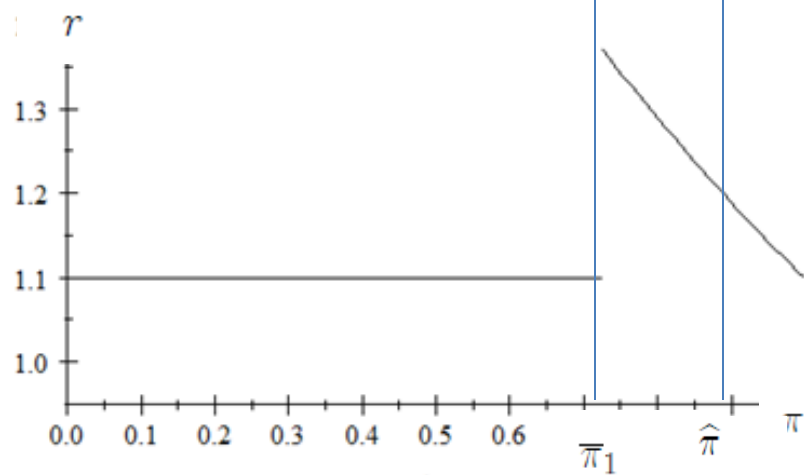


3.a

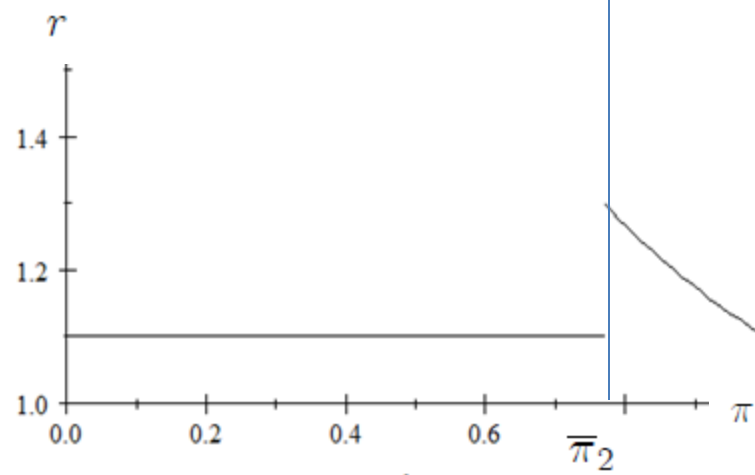
Figure 4



4.a



3.b



4.b

Figure 5

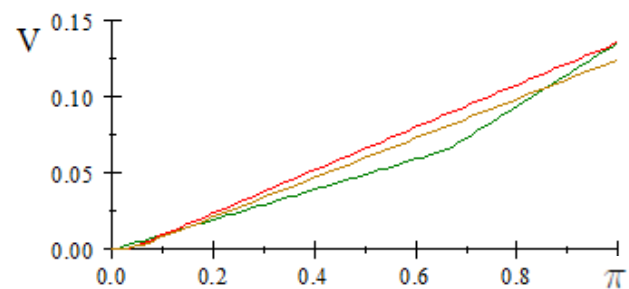
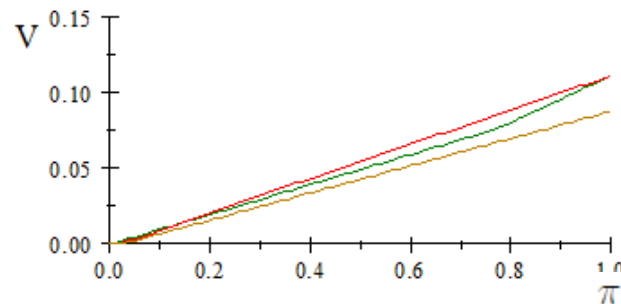
5.a:  $\beta=1$ 

Figure 6

6.a:  $\beta=1$ 

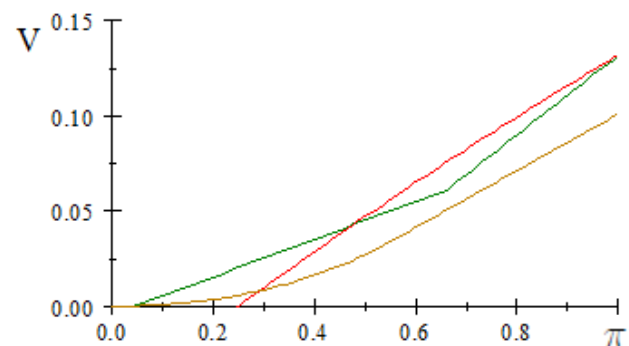
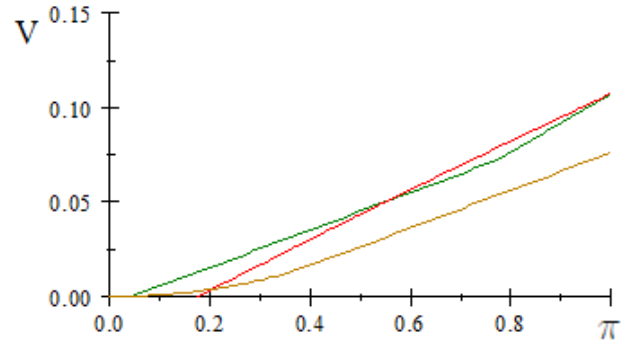
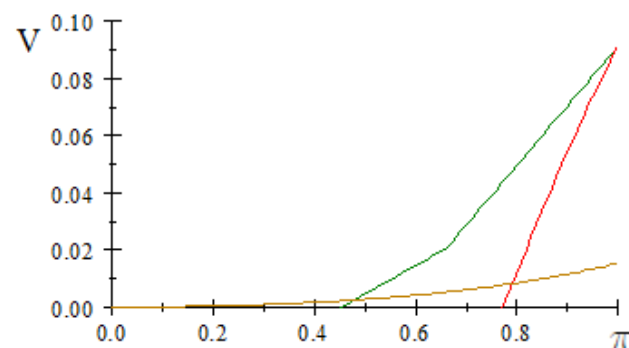
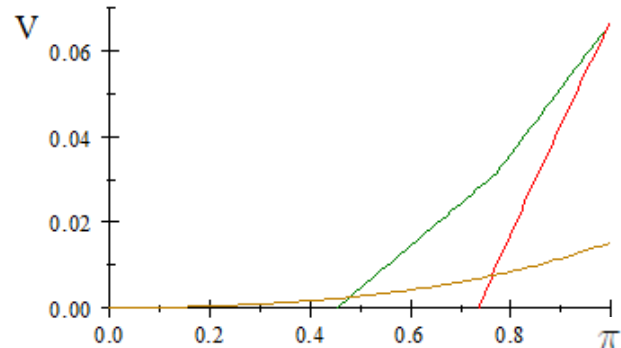
VAR



VR



VA

5.b:  $\beta=10$ 6.b:  $\beta=10$ 5.c:  $\beta=100$ 6.c:  $\beta=100$